

NATIONAL CURRICULUM, EDUCATIONAL PRACTICE AND GLOBE ACTIVITIES IN ESTONIAN SCHOOLS

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INTRODUCTION

While Estonia is on its way towards open learning society, more attention is paid to problem-oriented and action-oriented study. The Estonian National Curriculum for Basic and Secondary Schools was approved by Government in 1996 and the next version in 2002. The general part of our national curriculum establishes such common principles as - development of all students; student's activity and responsibility; balance and integration; problem orientation and curriculum openness as well as the other universally recognized issues. Our national curriculum supports the use of ICT in schools at all levels and in all subjects. The GLOBE program provides teachers with the opportunity of using Web-based materials and promoting different skills.

NATIONAL CURRICULUM AND EDUCATIONAL PRACTICE

The Estonian National Curriculum for Basic and Secondary Schools was approved by Government in 1996 and the next version in 2002. The general part of our national curriculum establishes such common principles as - development of all students; student's activity and responsibility; balance and integration; problem orientation and curriculum openness as well as the other universally recognised issues. The concept of environmental awareness and sustainable development has been incorporated in our curricula. The emphasis is put on the interrelations of natural, social and cultural environment and on the idea of sustainable attitude to the surrounding environment and sustainable development in particular. There are four common topics to all subjects in our curriculum. The topic *environment and sustainable development* is one of the so-called "integrated themes" in our national curriculum and another is *ICT and media* (Põhikooli ...2002). School and different subject teachers have to present the common topics within different subjects from the point of the local situation. They have to use ICT recourses in their teaching.

At the same time a declining interest in the study of science, old-fashioned methods of learning and teaching in schools are our problems in Estonia today. The traditional approaches to teaching science in schools have obvious merits. A single-subject approach still seems to be most common and not an integrative view or approach. But our national curriculum emphasize that the teachers have to promote the students' problem solving skills, autonomy and ability to reflect, conceptual thinking. We have to change methods of teaching and learning science in our schools to achieve the integrative approach. In learning process a problem-analysis, process-oriented, participatory and partnership approach is required. Students should learn to critically evaluate different options. Learners at all levels should be encouraged to use critical thinking and reflection as a prerequisite for concrete action for sustainable development.

The willingness to change must be based on recognition of the challenge to face. One challenge and remarkable initiative is the GLOBE program. The GLOBE program provides teachers with the opportunity of using Web-based materials in their subject teaching. GLOBE provides an inquiry-based approach to studying and understanding the environment as a science.

GLOBE ACTIVITIES IN ESTONIAN SCHOOLS

Estonia is a partner of the GLOBE Program since 1996. The Ministry of Education and Research <http://www.hm.ee/> and the Tiger Leap (national program on ICT in education, <http://www.tigrihype.ee/eng/>) gave good start to the program in Estonia. They provided GLOBE schools with computers and Internet connection, instruments for environmental measurements, resources for teacher training. Even more efforts were put for long-term maintaining of the program and regular motivation of students and voluntary teachers. It was achieved through offering activities and various challenges for students, refreshment of training, activating communication of teachers.

Environmental education and education for sustainable development in schools consists of two interconnected areas of activities. These are:

1. The content and organization of environmental education/education for sustainable development as specified in national curriculum;
2. Extracurricular activities, environmental programs, projects, eco-schools, nature schools etc.

The national curriculum specifies that environmental education and education for sustainable development is integrated into all subjects and goes through all the subjects beginning with Form 1 up to Form 12. In gymnasium the corresponding issues may be presented as optional courses.

GLOBE program provides an inquiry-based approach to studying and understanding the environment as a science. It allows teachers to promote the students' problem solving skills and conceptual thinking and put scientific inquiry and integrative approach to all disciplines into practice.

The inquiry-based approach is incorporated also in a regular science textbook for grade 7 approved by Ministry of Education and Research. The textbook and the accompanying working folders include several hands-on activities originated from the GLOBE Program. GLOBE data are used in our national progress tests in science and mathematics, organized by Ministry of Education and Research. The tests are a part of evaluation and assessment, included into the process of curriculum design and advancement of science and mathematics education.

The "school science days", student investigations and "GLOBE expeditions" offer to students a possibility to learn more about nature in the natural environment, and integrate knowledge owned in biology, geography and chemistry or physics classes for resolving practical tasks in the nature.

The curricular activities do not suffice in creating and meeting the environmental interests of the students of comprehensive and vocational schools. The state and local governments have given support to schools and teachers in organizing extracurricular activities, such as field studies, olympiads, competitions, conferences, etc.

Over 5 % of all Estonian schools and over 900 students are each year involved into GLOBE program activities. Since 1997, Estonian GLOBE students have reported data from 320 750 science measurements in the areas of atmosphere/climate, hydrology, soils, and land cover/biology, being so in the top ten of countries according to the number of measurements. In order to simplify using of GLOBE data by younger students, a database provided with the Estonian-language comments was also made available <http://ael.physic.ut.ee/globe/>. Estonian schools have good access to Internet and they can use these data for classroom studies, research, student-scientist partnerships, and worldwide school-to-school collaborations.

GLOBE teachers have made huge progress from beginners to advanced ICT users as a result of training and intensive work with computers and Internet. The advanced teachers are already using GLOBE resources in classroom. Some GLOBE teachers have started development of worksheets and learning materials that use the GLOBE graphs and data for learning science in school computer lab. Trans-national collaboration with GLOBE teachers from Czech Republic, Poland, Norway, Netherlands and UK was started in the year 2001 for propagation of e-learning in science and environmental education. Under the collaboration project e-LSEE <http://ael.physic.ut.ee/elsee/> (founded by EC under Socrates-Minerva program) a lot of curricula adapted e-learning materials for computer-assisted learning of Earth issues was produced in Estonian language.

Since 1999 annual contests of student research projects and follow-up student environmental conferences have been organized by the Estonian GLOBE Program and Ministry of Education and Research. The competition encouraged students to investigate specific environmental problems of surroundings through their own measurements and observations. Using of Internet data from the GLOBE database was also encouraged. The authors of best research projects have been nominated to represent Estonia in international competitions of students' environmental research in Turkey (2001, 2004), in UNEP International Children Environmental Conferences (2000, 2002) and GLOBE Learning Expedition in Croatia (2003). Abstracts of best research projects were published in Internet (<http://ael.physic.ut.ee/globe/>) and in a review books.

The competition of the year of are summarized by a students' environmental conference. The nation-wide student conferences have activated communication of teachers-project supervisors and students from all over the country. The GLOBE student conferences have been held in Rõngu Secondary School (2000), in Paide Gymnasium (2001, 2003), C. R. Jakobsoni Gymnasium (2002) and Kilingi-Nõmme Gymnasium (2004).



Figure 1. The GLOBE student conferences in Kilingi-Nõmme Gymnasium (2004). (Photo: Erli Aasamets)

The most exciting initiatives in learning science and technology outside the classrooms have been the "GLOBE Learning Expeditions", organized by the GLOBE Program in each summer in different sites of our country. So far, three such meetings have been held in Värskä (1998), Jäneda (1999), Kääriku (2000, 2001), Lapanina (2002), Rõuge (2003) and Kopra talu (2004).

At these meetings we strive to develop practical skills of environmental measurements and train younger students; to study comprehensively the local natural environment; to motivate students for further implementing of the GLOBE program in schools. Scientists and environmental experts from various institutions guide the expedition measurements. Besides Estonian scientists, the GLOBE scientists and trainers from the USA participated in Jäneda and Kääriku (2001) meeting.



Figure 2. USA scientists in Kääriku “GLOBE Learning Expeditions” 2001. (Photo: Imbi Henno)

Agenda of those student camps included an expedition part (hiking with GPS and investigation of local atmosphere, surface water, soil, botany, land cover), environmental games and social communication. Many GLOBE schools and other schools have started to organize their own science days and camps to integrate different subjects of curricula and offer a chance for learning in active environment.



Figure 3. “GLOBE Learning Expeditions” in Rõuge 2003, (Photo: Imbi Henno)

The active participation of Estonia in the GLOBE program was acknowledged internationally. In 1998, the patron of the GLOBE program, the Vice-President of the USA Al Gore and in 2001 The Embassy of United States Government and The United States Government the sent a letter of thanks to the Estonian Minister of Education for successful work in the program. Many schools have received honor rolls for excellent measurement results.

GLOBE teachers have made huge progress from beginners to advanced ICT users as a result of training and intensive work with computers and Internet. The graphs, maps and tables created from the GLOBE database are used for teaching of geography, biology, chemistry, physics, math and computer study. The advanced teachers are already using those resources in classroom. Some GLOBE teachers have started development of worksheets and learning materials that use the GLOBE graphs and data for learning science in school computer lab. Trans-national collaboration with GLOBE teachers from Czech Republic, Poland, Norway, Netherlands and UK was started in the year 2001 for propagation of e-learning in science and environmental education. The collaboration project e-LSEE <http://ael.physic.ut.ee/elsee/> that is founded by EC under Socrates-Minerva program, will produce new e-learning materials for computer-assisted learning of Earth issues, adapted to curricula of partner countries.

CONCLUSIONS

The GLOBE supports the multicultural study of social studies and geography by providing students with hands-on experience. GLOBE provides authentic, life-centered curricula and opportunities for meeting the special needs of students with a broad range of abilities and learning styles. The GLOBE program offers an excellent framework and success of the program in each country depends in great extent on local efforts for employment of its educational potential.

Collaborative work in GLOBE Program in Estonia helped to create an enthusiastic community of teachers, research scientists and students contributing to the innovation of science education in our country. The educational benefits from the GLOBE Program have not yet widened to all Estonian schools and mostly because of limited resources for instruments and teacher training. The innovative methodologies and concepts arisen from the GLOBE Program are at least partly included into the regular curricular activities. Though, GLOBE examples of good practice of hands-on learning and e-learning are used in schools in extending rates.

REFERENCES

Põhikooli ja gümnaasiumi riiklik õppekava (2002). Vabariigi Valitsuse määrus nr 56. *Riigi Teataja I*. 20, 869.